Conclusions: Subjects with KOA who improved knee instability were more likely to have a positive response to exercise therapy. This result needs to be confirmed in larger studies. Although not achieving statistical significance in this study, future studies should also consider investigating whether improvements in hamstring flexibility, knee extension range of motion, fear of physical activity, and depressive symptoms after therapeutic exercise might also be predictors of positive treatment outcome.

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REHABILITATION TO REDUCE SECONDARY OSTEOARTHRITIS AFTER TOTAL KNEE ARTHROPLASTY

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Purpose: In the presence of pain and weakness associated with knee osteoarthritis (OA), patients adopt asymmetrical movement strategies that increase the load on the non-operative limb and foster a pattern of disuse on the operative limb. These asymmetries persist after total knee arthroplasty (TKA) and may be related to the high incidence of contralateral TKA. Rehabilitation that restores symmetrical movement patterns may provide optimal outcomes after TKA and reduce the need for future contralateral TKA. The aim of this project was to determine the effectiveness of an early rehabilitation program on restoring normal and symmetrical movement after TKA.
Methods: 9 patients with unilateral OA who underwent TKA were evaluated. 4 subjects participated in progressive strengthening rehabilitation after TKA (Strengthening Group) and 5 patients underwent progressive strengthening as well as a biofeedback retraining program that promoted weight bearing symmetry during functional exercises (Symmetry Group). Feedback of weight distribution between limbs during functional retraining exercises was provided via a custom computer program using a Wii Balance Board (Nintendo, Inc.). Similar visual feedback was supplied on a leg press device with dual integrated force plates under each foot (customKYnetics, Inc., Versailles, KY). Biomechanical outcomes (joint kinetics and kinematics) before and after rehabilitation were assessed for the Symmetry group. In addition, comparisons between groups were made at the time of discharge from physical therapy (PT), which occurred 10 weeks after TKA. Symmetry ratios for these metrics (Operated limb divided by Non-Operated Limb) were also evaluated. Qualitative assessment of the mechanisms by which visual feedback altered joint kinetics and kinematics were evaluated for a subset of the subjects.
Results: After TKA and rehabilitation, subjects in the Symmetry group demonstrated a substantial improvement in knee flexion angles (Fig. 1) and moments (Fig. 2) on the operated limb during stance compared to pre-operative values.

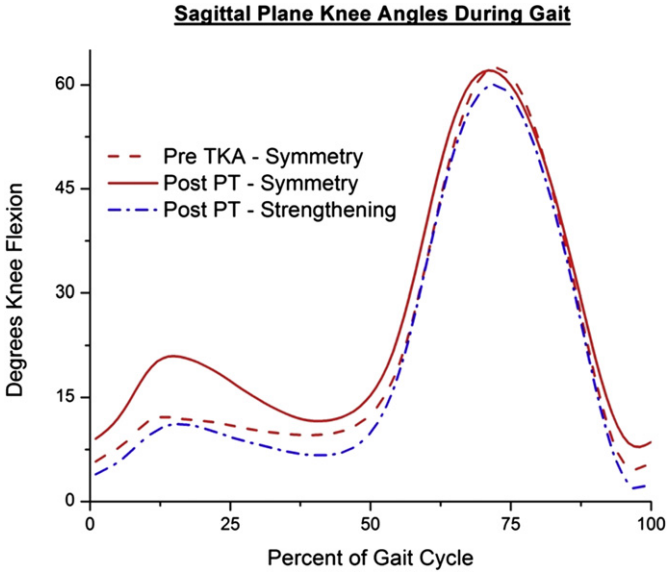

Fig. 1

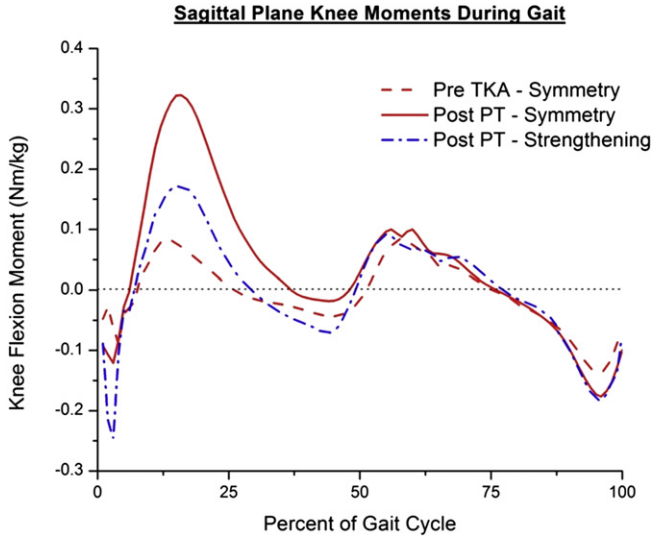

Fig. 2
Peak sagittal plane knee angles, excursions and moments at the conclusion of the PT program (10 weeks after TKA) were greater in the patients who underwent symmetry retraining (Figs 1 & 2) and the symmetry ratios between limbs for the Symmetry group were all 1.0 or greater (Table 1), which is indicative of symmetrical movement. In the Symmetry group, there was no apparent decrease in peak adduction moment on the non-operated limb over time or compared to the Strengthening group. When subjects were presented with visual feedback to improve weight bearing, they demonstrated concomitant improvements in joint kinematic and kinetic symmetry (Fig. 3).

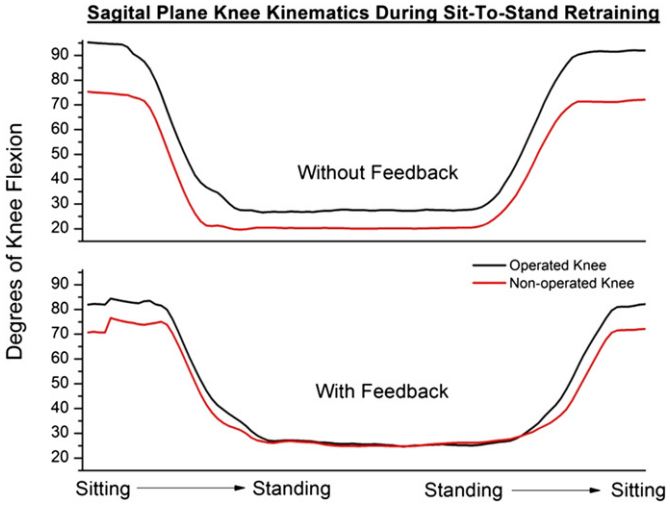

Fig. 3
Conclusions: Subjects in the symmetry group demonstrated improved knee excursions and moments on the operated limb during gait that suggest more normal use of the quadriceps muscle. Eccentric action of the muscle at this time is essential for the normal shock-absorption of the lower extremity during this period of high loading. Sagittal plane kinematics and kinetics were more symmetrical in subjects who underwent symmetry training. Although we did not see a reduction in the adduction moment on the non-operated limb in the symmetry group, the improved use of the operated limb after surgery is promising. Although subjects were only provided with feedback as to weight distribution, they were able to alter movement patterns to improve kinetic and kinematic symmetry (Fig. 3).

Symmetry Ratios (Operated / Non-Operated Limb)

	Symmetry Group (Pre-TKA)	Symmetry Group (Post-Rehabilitation)	Strengthening Group (Post-Rehabilitation)
Knee Flexion Excursion Symmetry Ratio	0.5 +/- 0.3	1.1 +/- 1.0	0.7 +/- 0.4
Peak Knee Flexion Moment Symmetry Ratio	0.7 +/- 0.6	1.2 +/- 0.8	0.8 +/- 0.5
Peak Knee Flexion During Stance Symmetry Ratio	0.8 +/- 0.8	1.0 +/- 0.3	0.8 +/- 0.2

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CLINICAL TRIAL OF STEP-UP EXERCISE THERAPY USING DVD FOR PATIENTS WITH HIP OSTEOARTHRITIS

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Purpose: Efficacy of exercise treatment for osteoarthritis (OA) has been reported controversially. We developed a new exercise program designed as several step-up stages in accordance with patient disease activity, using a digital video disc (DVD). In this study, we analyzed the efficacy of this step-up exercise therapy program using DVD for the hip OA patients.
Methods: We prospectively recruited 45 patients (male1, female44) with symptomatic hip OA were included. All participants provided informed consent to the study which was approved by the Institutional Review Board. They were assigned into 2 groups; (1) DVD group in which the patient was instructed to perform exercise by watching specially-developed DVD program, (2) control group in which the patient was instructed to perform exercise by referring to the home exercise instruction documents. The original DVD was developed among the community of the orthopaedic surgeons, physical therapists and the orthopaedic research nurse. On the DVD, the step-up program had 6 stages consisting of 3 OKC (Open kinetic chain) exercise programs and 3 CKC (Closed kinetic chain) exercise programs. Patients were instructed to perform exercise daily for 30-40 minutes by watching DVD, with completing each stage for 2 weeks. All patients received the following assessments at the entry to the study and 3 months later; (1) muscle volume in the lower limb estimated by impedance of living body instrument, (2) muscle strength by dynamometer, (3) gait speed by time up and go test, (4) stability of lower limb by one-legged standing time (up to 120 seconds), and (5) the objective evaluations by Oxford hip score, Health related Quality of life by SF-8 and Self-efficacy (Self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance) by General Self-efficacy scale.
If the patient had OA in both hips, only one hip with more painful side was included.
Results: There were 12 patients (mean age 54.0 years) in the DVD group and 33 patients (51.7) in the control group.
At 3 months, time up and go test was significantly improved from 7.4 seconds to 6.9 seconds (p=0.015) in the DVD group and from 7.6 seconds to 7.2 seconds in the control group (p=0.024). The effect size of this improvement was superior in the DVD group. The stability of lower limb by one-legged standing time was significantly improved only in the DVD group from 81.6 seconds to 103.8 seconds (p=0.02).
The muscle volume of the lower limb was not changed significantly in both groups. The muscle strength of hip abduction was significantly improved from 114.2 to 133.2 newton (p=0.031) only in the control group.
SF-8(physical), General Self-efficacy, and Oxford hip score showed tendency of improvement in both groups. However, statistically significant improvement was only seen for pain score of Oxford hip score from 11.9 to 9.6 (p=0.002) in the control group.
In hearing of impression regarding DVD program, patients had feeling of better understating of program content by movie, or of accelerating effect by synchronization with the instructor's action in the DVD.
Conclusions: Physical function and pain of the patients were significantly improved in both DVD and control groups. Although muscle volume and muscle strength were not improved apparently, physical function including the time up and go test and one-legged standing time was improved better in DVD group than control group. The body balance might be improved more by visual education of DVD movie. The patients' comments were also related with encouragement of correct understanding of exercise using DVD.

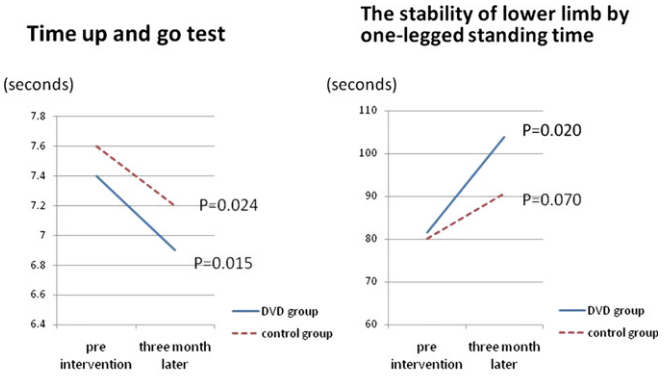

Figure :The effect of exercise for hip OA patients

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PEOPLE WITH PATELLOFEMORAL OSTEOARTHRITIS HAVE SMALLER HIP MUSCLE VOLUMES THAN HEALTHY CONTROLS

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Purpose: The patellofemoral joint (PFJ) is a frequently affected by the osteoarthritis (OA) process and contributes significantly to the OA-related pain and reduced physical function. Due to the unique biomechanics of the PFJ, it is likely that rehabilitation strategies tailored to PFJ OA will optimise clinical outcomes. However, currently there is limited knowledge of the modifiable impairments associated with PFJOA, which could be targeted in rehabilitation programs. Hip muscle dysfunction has been proposed to influence PFJ stress and hence, may play a role in the development or progression of PFJOA. Specifically, weakness of hip abductor muscles may result in excessive femoral adduction, which may increase contact pressure in the lateral PFJ. Therefore, the aim of this study was to compare the volumes of the primary hip-abductors (gluteus medius, gluteus minimus and tensor fasciae latae) of individuals with PFJOA, with those of healthy controls.
Methods: 50 individuals with radiographic evidence of PFJ OA and symptoms stereotypical of PFJ involvement, aged > 40 years and 13 people aged > 40, with no lower limb problems were recruited. Magnetic Resonance (MR) images of the hip region were obtained. The cross-sectional area of the hip-abductor muscles were manually segmented from each axial MR slice, and were used to calculate muscle volume. A test-retest reliability study was performed to assess the intra-investigator reliability of this procedure. The muscle volumes of were normalised to body weight and analyses were performed with and without gender as a co-variate.
Results: There were no differences in participant characteristics between the PFJ OA group (female 40 (63%); age 55 ± 10 yrs; height 1.69±0.09m; weight 76±13 kg) and control group (female 10 (62%); age 52±6yrs; height 1.68±0.10; weight 71±13kg). The techniques for assessing muscle volume were shown to be reliable (ICC ≥ 0.997). Comparisons of mean normalised muscle volumes revealed significant between-group differences for gluteus medius (mean difference: 95% confidence interval 0.47: 0.08 to 0.86 $cm^3.kg^{-1}$; p = 0.02), gluteus minimus (0.21; 0.09 to 0.33 $cm^3.kg^{-1}$; p = 0.001) and tensor fasciae latae (0.23; 0.03 to 0.42 $cm^3.kg^{-1}$; 0.024). Inclusion of gender as a covariate did not change the significant findings.